

TECHNICAL MEMORANDUMS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

No. 265

DEVELOPMENT OF WING-STEERED MESSERSCHMITT GLIDERS.

From "Flugsport," April 15, 1924.

June, 1924.



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TECHNICAL MEMORANDUM NO. 265.

DEVELOPMENT OF WING-STEERED MESSERSCHMITT GLIDERS.\*

Up to the time of Harth's 21 minute record flight, the results of the experiments of the airplane construction company of Harth-Messerschmitt with wing-steered gliders have already been published. Subsequent reports have been published only in the form of brief notes by foreign news-gatherers and have been based, for the most part, on erroneous suppositions. The present article is a brief report of the actual development.

1. The record glider of 1921 bore the type designation S8. It had a high wing, braced with wires above and below, and is known from its photographs.

2. This glider closely resembled the best known and oftenest flown S10 which, however, had instead of brace-wires, a strut connecting the landing runner with the wing spar. This glider has demonstrated its availability and reliability in about 200 flights. It was found to be especially suited for school use, a large number of pupils having qualified on it for their certificates as glider pilots.

3. S9 was a glider with a short fuselage and a small stabilizing plane. The wing had a negative sweep back. The lateral steering was accomplished by means of resistance flaps on the wing tips, the same as had already been successfully done on the S8. Instead

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\* From "Flugsport," April 15, 1924, pp. 122-125.



of ropes, a torsion tube, located in the wing, was at first employed. The experiments could not be terminated, on account of the numerous innovations.

4. S11 was thought to be an improvement aerodynamically on the S10. It resembled the S10 in the chief characteristics of its wing-steering system, but differed from the S10 in the substitution of a plywood fuselage for the former fuselage of steel tubing and lattice work and in the transfer of the entire steering mechanism to the inside of the wings and fuselage. Only short flights were accomplished, however, due to faulty steering-gear fittings and the lack of a competent pilot.

5. The type S12 occupies a special position. Since the S11, built in the spring of 1922, exhibited unfavorable flight characteristics during its first short flights (which were subsequently traced to the above-mentioned remediable defects), a new type of glider was built from the parts (plywood fuselage, new wing section and the rope steering gear saved from the S10) provided for the S11. The S12 was doomed, however, by the unsuitable combination of the new wing section with the old rope steering gear. After five falls, fortunately without injury, Messerschmitt discovered their cause.

The wing section of the S11 and S12 had been developed from that of the S10, with such improvements that it was subsequently adopted by other airplane builders (Konsul, Darmstadt). Since, however, the time was short for completing the S12 before the 1922



Rhön soaring-flight contest, the properties of the wing section could not be tested in the wind tunnel. Thus it happened that, while the center of pressure in the S10 lay but a short distance behind the center of rotation D of the old wing section (Fig. 3), the center of pressure of the new wing section was about 100 mm (4 inches) back of it. As soon as the angle of attack exceeded  $-3$  degrees, there occurred the situation illustrated by Fig. 3. The center of pressure, which was at  $M'$  in normal flight, passed beyond B to  $M''$ . The instant it passed B, the wing section rotated about this fixed point and the wing spar, previously stressed upward, was suddenly stressed downward. This sudden reversal caused a sudden dive of the airplane, which could not be overcome, since any pull on the upward-steering rope only resulted in a further deflection of the wing spar. All the falls of this type were traced to this cause.

The S13 was built in the spring of 1923, on the basis of previous experience and as the result of a series of considerations and careful computations. As in the S9 and S11, its most conspicuous characteristic was the placing of the steering gear entirely inside the fuselage and wings. Furthermore, this glider employed, for the first time, the single control stick. The stabilizing plane was adjusted by means of a lever, which could be fastened in any position. The warping was done by means of a strong steel tube extending along the wing spar. Since it had been well designed in all its details, it presented the spectacle of a practical wing-



steered glider. After a few very successful flights it was unfortunately destroyed by a fall caused by the breaking of a steel-tubing rudder-post with too thin walls.

Two other gliders, under the type designation S14 and differing but slightly from the S13, were completed in time for the 1923 Rhön contest. The serviceableness of this type was demonstrated by the "storm-flight" of Hackmack on the 30th of August, 1923, during which, in a wind of 20 m (65 ft.) per second, the highest altitude of the contest was reached.

Translation by Dwight M. Miner,  
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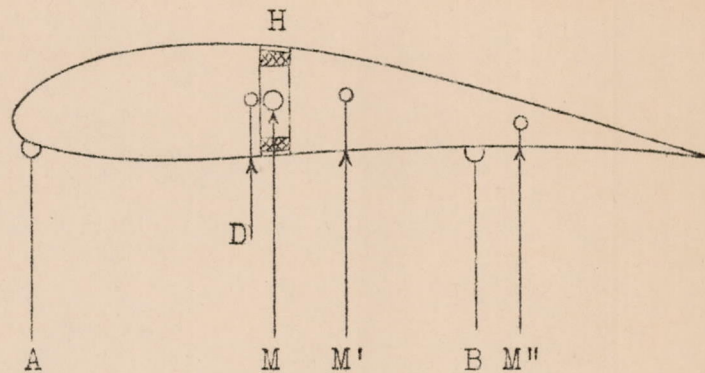


Fig.3. Wing section of the Messerschmitt glider, S 12

A Downward-steering rope.

B Upward-steering rope.

D Center of rotation of wing.

M Center of pressure of S 10 wing section with angle of attack for minimum sinking speed.

M' Center of pressure of S 12 wing section for the same angle of attack.

M'' Center of pressure for an angle of attack of about -5 degrees.

H Wing spar.



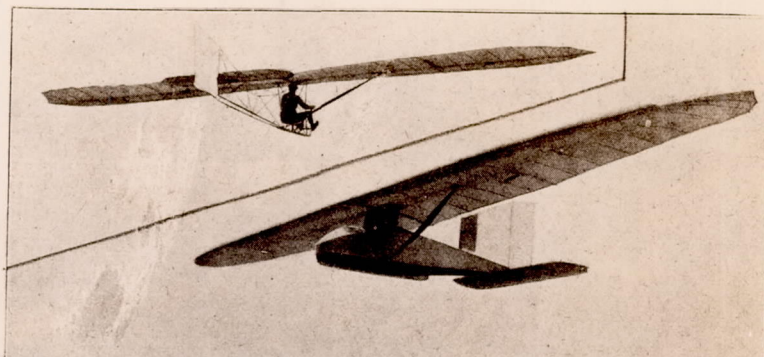


Fig.1 Wolf Hirth on the S10, Apr.1921(Above)  
 Fig.2 Wolf Hirth on the S12 over level  
 ground. (Below)

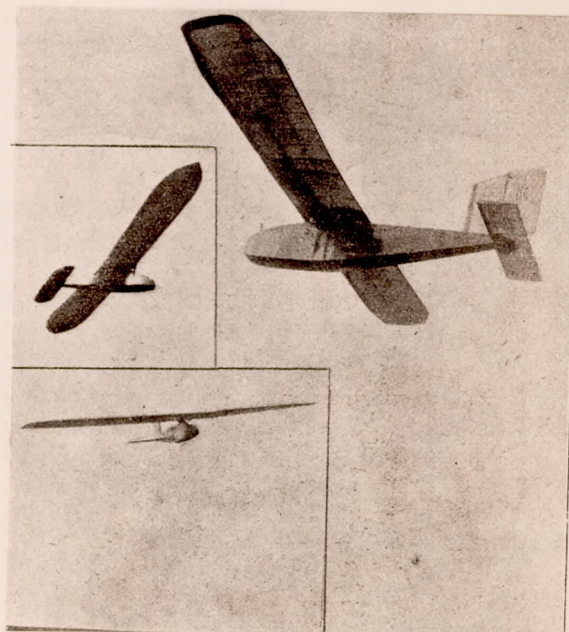


Fig.4 Wolf Hirth on the S12 in  
 October, 1922.(Above, left)  
 Fig.5 W.Hirth on the S11 in  
 May, 1922. (Below, left)  
 Fig.6 Hackmack on the S14 in  
 Aug., 30, 1923.(Above right)